



Economic Development in an Era of Climate Change

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This essay explores how climate change alters the pursuit of economic development: the transformation of poor economies and their people into prosperous ones.

This is hardly the first attempt to reconcile the climate agenda with that of economic development. The United Nations' Sustainable Development Goals are significant for defining a dual agenda where development targets for people and planet sit alongside each other in a unifying framework.¹ Much commentary focuses on the compatibility of the two agendas. A radical and specious view pits progress on climate change and economic development as strict substitutes and calls for no less than the unravelling of economic development to save the planet.² Cooler heads point instead to their complementarity: the critical role of economic development in supporting adaptation and the recognition that investments in the green transition will propel economies rather than sacrifice living standards.³

In contrast, this essay takes as its starting point that the goals and salience of economic development are immutable. The question posed here is how the quest

for economic development changes in a world gripped by a changing climate. The essay argues that climate change will force three major changes: a reappraisal of the causes of and prospects for development, the rebirth of the economics of transition, and a reformulation of the problem development is trying to solve. In a final section, it asks what these changes could mean for international security and for the community of national and global actors who set policy and strategy in this field.

THE CAUSES OF AND PROSPECTS FOR DEVELOPMENT

Why are some countries richer or poorer than others? This is the motivating question that underpins the study of development economics.⁴ A rich literature has sought to identify the “deep determinants” that best explain comparative economic performance over the long term. That search has increasingly boiled down to a focus on geography and institutions.⁵ A country's geography affects its economy through multiple channels including

agricultural productivity, disease vectors, and proximity to markets. A country's institutions, defined here as the rules and norms that govern society—including those imposed by external actors—affect the incentives individuals face to engage individually or collectively in productive activity. Which of the two is the dominant factor cannot be definitively resolved empirically, and so it is partly a matter of opinion. Nevertheless, the majority opinion, and the weight of evidence, backs institutions.⁶

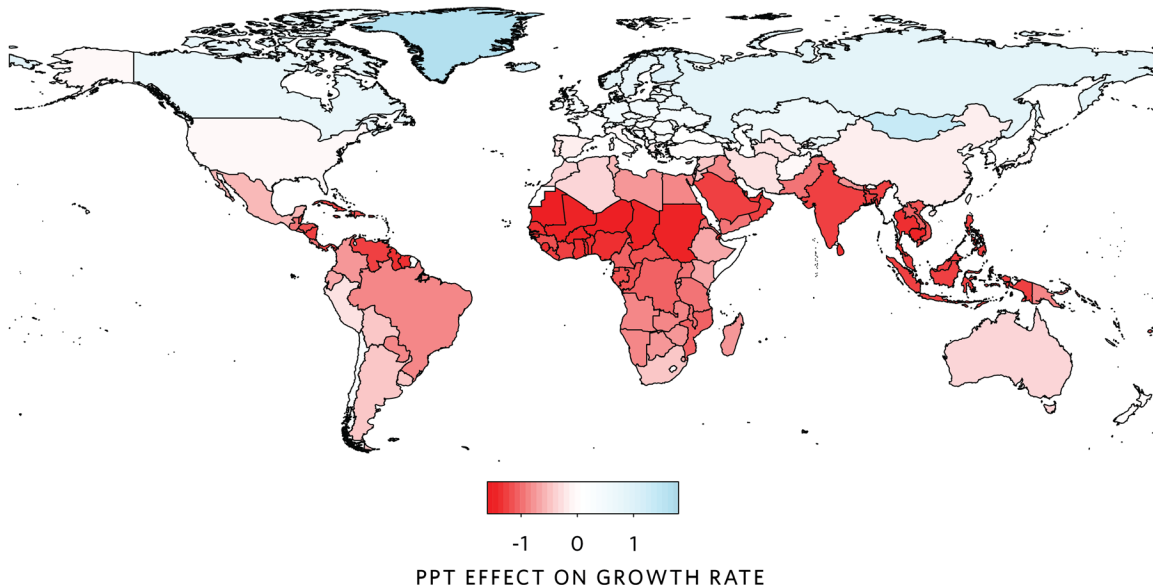
Could climate change shift the dial toward geography?⁷ Recent research, focusing specifically on the effects of climate change on average temperatures, points in this direction. Temperature has been found to affect income via agricultural yields, the physical and cognitive performance of workers, demand for energy, as well as the incidence of crime, unrest, and conflict. By one account, in the second half of the twentieth century, an average temperature rise of 1°C in a given country and year caused per capita income to fall by, on average, 1.4 percent.⁸ Critically, the effect persisted once the

temperature shock was over, thus affecting a country's economic performance over time.

Subsequent research has shown that the relationship between changes in temperature and income is nonlinear.⁹ Thus, while global warming could spell greater economic productivity for countries whose average annual temperatures are low, rising temperatures augur increasingly dramatic falls in productivity in countries with already warm climates.¹⁰

These studies suggest that future analyses on the deep determinant of economic performance could find a larger role for geography, with geography proving especially important in determining countries' economic fortunes during the current and future era of climate change. Furthermore, they indicate that economic prospects for today's poor countries will disproportionately decline, since those countries, on average, begin with higher temperatures and are forecast to record especially large increases in temperature (see figure 1).¹¹

FIGURE 1
Estimated Change in Economic Growth Associated With a 1 Percent Increase in Average Temperatures



Source: Reprinted with permission, from Marshall Burke, Solomon M. Hsiang, Edward Miguel, "Global Non-linear Effect of Temperature on Economic Production," *Nature* 527 (2015): 235-239, <https://doi.org/10.1038/nature15725>.

Climate change's impact on economic performance will not be limited to its effect on average temperatures. Other extreme weather events such as droughts and fires, as well as sea level changes, seem just as, if not more, relevant.¹² One way to think about these effects is to consider how extreme weather events will shape "growth episodes." Economic performance in the medium to long term is episodic in nature for all but the richest countries that remain at the technology frontier.¹³ Virtually all countries have experienced periods of rapid economic growth and periods of dismal growth. Comparative performance is explained by the superior ability of some countries to sustain growth; poor countries have a greater propensity to reverse.¹⁴ In other words, shocks, and how they are managed, play a large part in explaining comparative economic performance.

If climate change augurs a world of more frequent and intense shocks, sustained episodes of fast economic growth—so-called growth miracles—will become harder to pull off. The result will be fewer poor countries succeeding in converging on rich country income levels, compared to a world without climate change. This comes at a time when convergence has become more commonplace since the start of the twenty-first century.¹⁵

Dimmer prospects for economic convergence are exacerbated by the weak institutions that characterize today's poorest countries. Institutional weakness is associated with deeper growth decelerations, which implies that poor countries face a harder road to recovery after any given shock.¹⁶

One countervailing factor that could raise the economic fortunes of poor countries is the longer-term possibility of ubiquitous and abundant energy, on the assumption that the marginal cost of renewable electric power continues to fall. This would drive down the cost of business in poor economies, not to mention materially improving the lives of their people. Such an outcome hinges on investments in renewable infrastructure and access to renewable technology by developing countries.

TRANSITION ECONOMIES

Every country today faces the challenge of undertaking a green transition: the switch to a zero-carbon economy with its far-reaching consequences and demands on land, planning, infrastructure, investment, technology, jobs, and social justice. The attendant disruption will play out over the next decades, in addition to the disruptive effects of a changing climate.

For a minority of countries whose economies are organized around fossil fuel extraction, a more fundamental overhaul beckons. There are twenty-one economies for whom coal, petroleum, and natural gas account for a majority of merchandise exports; in six of these countries, fossil fuels represent more than 90 percent of those exports (see figure 2).¹⁷ Even in a world where some nonrenewable energy generation continues, the economic models of these countries will require reinvention. This will emerge as a central project for economic development in the years ahead.

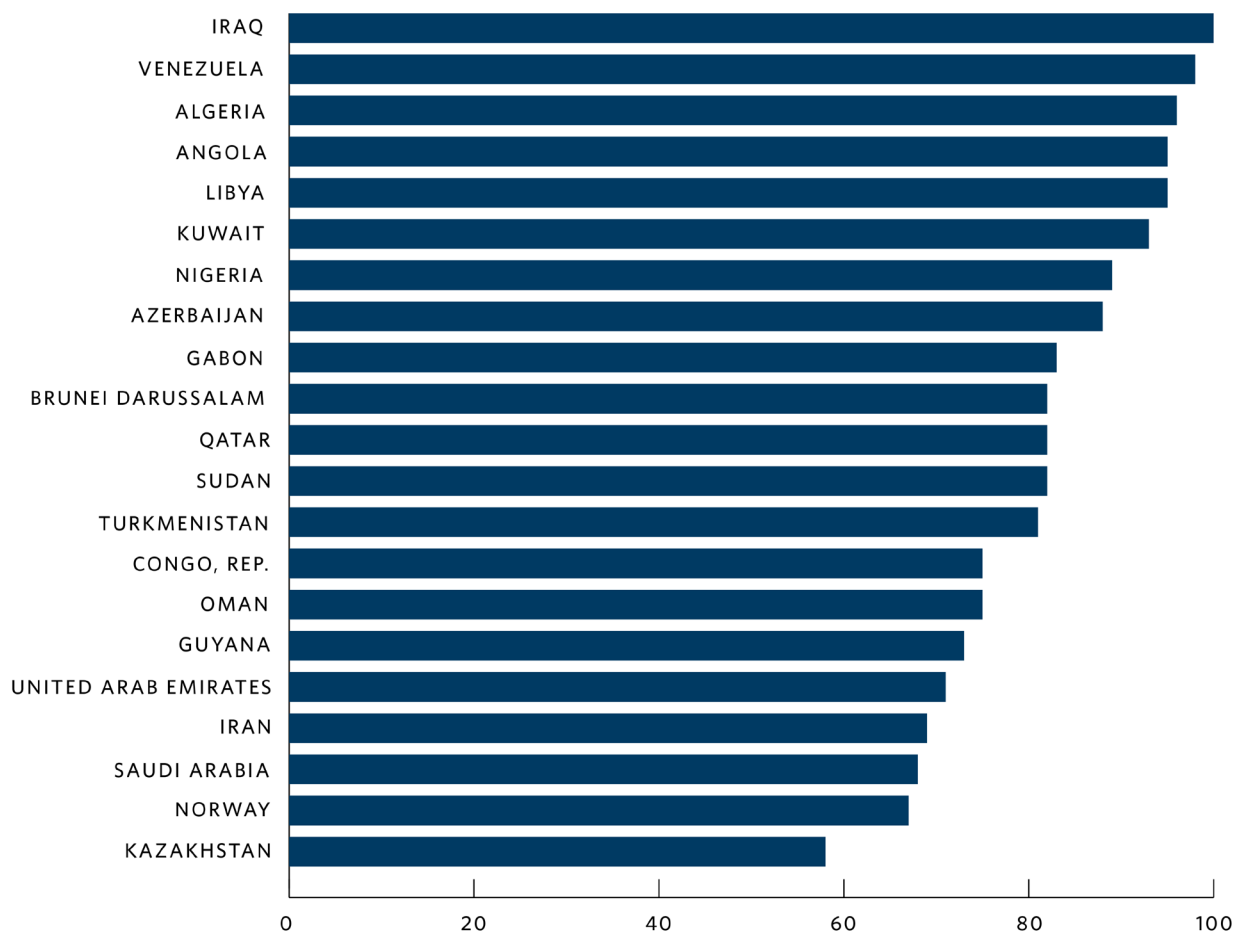
Here, the economics of transition, which describes the metamorphosis of dozens of economies from a centrally planned to a market-based system in the late twentieth century, offers both a partial analogy and playbook.

Central to that analogy is the anticipation of a drastic drop in income. For countries from the former Soviet Union, economic contractions ranged from 10 to 50 percent in the initial years of transition, marking a period of painful adjustment with social, political, and psychological dimensions.¹⁸ Reductions in output of a similar order of magnitude can be expected for the twenty-one fossil fuel-export economies, though spread over a longer time horizon.

Fossil fuel exporters can also be expected to undertake some of the same reforms required of transition economies. This includes redefining the role of the state in the economy, from serving as a source of growth and rent capture via state-owned enterprises to an enabling role that embraces greater liberalization, including through the removal of price controls and subsidies

FIGURE 2

Twenty-one Economies Whose Exports Are Dominated by Fossil Fuels



FUEL EXPORTS AS A SHARE OF MERCHANDISE EXPORTS, NEAREST YEAR

Source: “Fuel Exports (% of Merchandise Exports),” World Bank, accessed December 1, 2022, <https://data.worldbank.org/indicator/TX.VAL.FUEL.ZS.UN>.

connected to the energy sector. Among the fossil fuel-exporting economies, an average of 3 percent of annual income is devoted to pretax subsidies for fuel, compared to under 1 percent in all other countries; in Libya, that share is an astonishing 17.5 percent.¹⁹ Taken together with the anticipated drop in income, these reforms signify the need to recalibrate the social floor to an affordable level and redefine the social contract.

Such reforms are hardly straightforward. Indeed, the process of economic transition proved to be a humbling experience for the economic profession.²⁰ The prevailing wisdom that faster policy adjustment was better has been challenged by the relative success of more gradual reforms in East Asia, in contrast to the Big Bang approach advocated and adopted in Eastern Europe. The slow recovery from transition in many countries has prompted analysts to place greater emphasis on the

importance of forging institutions to support economic development—though the absence of a practical set of policies to support institution-building is telling. The impending transition for fossil fuel exporters is likely to entail a similarly daunting and poorly signposted course.

As fossil fuel exporters reduce their reliance on nonrenewable natural resources to spur their economies and generate export revenue, a new generation of countries are poised to take their place: those endowed with significant natural wealth in the precious minerals and metals that are central to renewable energy production, transmission, and storage.²¹ How should we assess their prospects in the green transition?

Extractive industries present irresistible opportunities for generating income as well as inescapable tests of governance. The stakes are heightened when the natural resource in question is easily transported and truly scarce and so is capable of yielding large economic rents, as has been the case for oil. Such resources can translate into vast geoeconomic power or leave countries stricken by the resource curse.

On the surface, this would appear to characterize many of the metals and minerals involved in renewable energy as the green transition intensifies. The production of several such metals and minerals is more geographically concentrated than fossil fuels, and in many cases, proven reserves are insufficient to meet forecast demands under a net zero global economy.²²

On closer inspection, however, a different picture emerges. There are multiple technological pathways open to the generation and storage of renewable energy, which should allow some substitution between one natural resource and another. In the case of rare earth metals at least, geographical concentration does not reflect genuine scarcity but rather the limited commercial interest in extraction and processing. In addition, minerals and metals are recyclable, unlike fossil fuels. On this basis, natural resource wealth

in precious minerals and metals is unlikely to play a determining role in the future fortunes of developing economies—or exert the same economic power that oil wealth does today.²³

FROM DEPRIVATION TO INSECURITY

The past three decades represent an era of historic development progress. That progress is commonly illustrated by the changing share of the world population living in extreme poverty, which has emerged as a universal measure and proxy of global economic development. This indicator stood at 38 percent in 1990 and has since fallen to a mere 8 percent.²⁴

The above sections suggest that climate change will act as a brake on economic development—but that does not mean that the pattern of global poverty reduction is destined to end.

While climate change may reduce economic output in poor countries, this effect is measured against the counterfactual of a world without climate change; other factors could outweigh the impact of climate change so that the net effect remains one of ongoing economic progress. Moreover, we may be arriving at a structural juncture that challenges this inference.

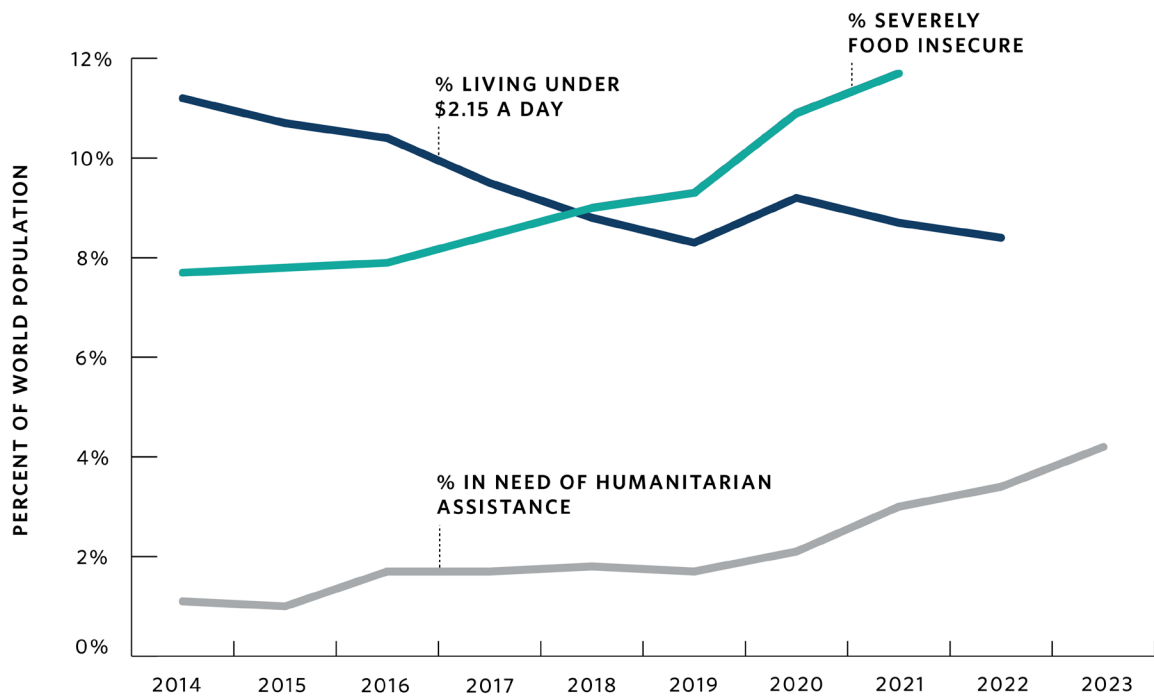
Climate change augurs a fundamental evolution in what is understood as the core challenge of economic development. Historically, that challenge was one of deprivation. Households, communities, or governments lacked the resources they required to meet people's basic needs and enable them to thrive. Today, the challenge is increasingly one of insecurity. In an era where shocks, whether localized or global in scope, have become more frequent and intense, households, communities, and governments lack the means to protect themselves and the resources they've accumulated.

We see some evidence of this changeover in divergent—and seemingly incongruous—trends, as climate change

takes effect. Over the last decade, the share of people in the world living in extreme poverty has continued to fall, albeit at a slower rate than in the prior two decades. Meanwhile, the shares of people facing severe food insecurity—that is, having run out of food or been forced to go without meals for a day or more—and requiring life-saving humanitarian support have both been trending up. Since 2018, the share of people facing severe food insecurity has exceeded the share living under the global poverty line (see figure 3).

Deprivation and insecurity are, of course, linked. A significant share of the world’s extreme poverty is understood to be a transient phenomenon; in Africa, transient poverty is 50 percent more common than chronic poverty.²⁵ In 2010, 97 million people—equivalent to 1.4 percent of the world’s population—were estimated to have been thrown into extreme poverty by out-of-pocket health spending alone.²⁶ Indeed, the number of people that will remain in extreme poverty in 2030 is forecast to be 32 to 132 million higher as a result of climate change.²⁷

FIGURE 3
The Changing Nature of the Development Challenge



Source: Author’s calculations based on Daniel Gerszon Mahler et al., “Pandemic, Prices, and Poverty,” World Bank Data Blog, April 13, 2022, <https://blogs.worldbank.org/opendata/pandemic-prices-and-poverty>; UN Food and Agriculture Organization, International Fund for Agricultural Development, UN Children’s Fund, UN World Food Programme, and World Health Organization, *The State of Food Security and Nutrition in the World 2022: Repurposing Food and Agricultural Policies to Make Healthy Diets More Affordable* (Rome: FAO, 2022), <https://doi.org/10.4060/cc0639en>; and UN Office for the Coordination of Humanitarian Affairs, “Global Humanitarian Overview 2023,” December 1, 2022, <https://www.unocha.org/2023gho>.

However, the impact of climate change on poverty may turn out to be one of its less salient features—and quantifying this impact shouldn't be necessary to validate the importance of climate change in understanding economic development. Rather, the emergence of climate change should force a reassessment of what indicators we rely on to capture development progress and what policies are prioritized to promote it.

CONSEQUENCES FOR INTERNATIONAL SECURITY

The preceding sections describe how climate change will alter the pursuit of economic development in poor countries. These changes have ramifications far beyond both poor countries themselves and the field of global development. Below are seven hypotheses describing possible implications for international security. These are intended to provoke discussion rather than to be conclusive, but they point both to the breadth of these effects and their relevance to the international security community.

A growing sense of grievance among the world's poor countries, pitting the winners and losers of climate change against each other. This could include the re-emergence of the Non-Aligned Movement and Group of 77 as prominent factions in the multilateral system.

Increased salience of failed states that are deemed incapable of development as a result of climate change and thus impervious to foreign investment. Failed states act as an overlapping source of global instability with climate change.

Spheres of global risk defined more prominently by geography. Strategies for managing risk will have to respond accordingly, with greater emphasis put on weather patterns and linkages drawn across national borders.

Instability in economies whose exports are dominated by fossil fuels. The green transition in these countries should be expected to generate economic, political, and social upheaval, with effects potentially reverberating beyond national borders.

Power derived less from control of natural resources and potentially more from control of transmission routes for renewable energy and intellectual property of green technology. Norms regarding the use of green intellectual property are not set in stone and will determine whether such power is manifested or not.

More regular deployment of national and international security forces to assist communities affected by crises. The normalization of post-disaster reconstruction, alongside humanitarian relief operations, will place greater demands on security forces and make their work more visible to civilians.

Increasing application of methods and tools (such as scenario planning and risk management) drawn from the security field into economic planning and global development. This has the promise of bringing greater alignment between the two policy communities.

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NOTES

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